

Care of foliage plants



Agriculture
Canada

Publication 1732/E



630.4
C212
P 1732
1982
(1985 print)
c.2

Canada

PUBLICATION 1732/E, available from
Communications Branch, Agriculture Canada,
Ottawa K1A 0C7

©Minister of Supply and Services Canada 1982
Cat. No. A53-1732/1982E ISBN: 0-662-11857-X
Printed 1982 Reprinted 1985 10M-3:85

Également disponible en français sous le titre
Cultures des plantes vertes.

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Care of foliage plants

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With more people living in urban settings that provide little space for gardening, indoor plants can be most enjoyable and rewarding. They help create a warmer home environment; a home is seldom complete in its furnishings without plants.

Foliage plants have become very popular in houses, apartments, offices, and other interiors. Even though these plants can, and do, flower occasionally, they are grown mainly for their attractive foliage or growth habit, and provide more or less lasting decorative effects.

One only needs visit a garden center or other outlet where foliage plants are sold to see the many different kinds available. Some grow into trees, others remain small. Some grow as vines, others trail. You can find plants that are compatible with almost any interior decor, and still perform well under the available conditions.

In many homes and indoor environments, conditions are less than desirable for plant growth. Foliage plants are usually the easiest house plants to maintain because they need less light than flowering plants. Most disorders are caused by improper care and the wrong environment. Since the object is to keep the plants alive and healthy and yet avoid rapid growth, adequate light and a limited water and fertilizer supply are key factors for success. If you know the essential cultural requirements of these plants, you can match the climate inside your home to their needs and keep them looking their best.

Preconditioned plants are important

Foliage plants sold in garden centers and other retail outlets are usually propagated and grown to saleable size in greenhouses or outdoor nurseries in warm climates. Under these conditions, plants grow rapidly and are forced to size in a minimum time. The light they receive may be as much as 100 times that in a well-lit room, and fertilizers and water supplied may be 25 to 50 times more than they will need in your home.

A sudden move from such subtropical conditions into a drier, low-light home environment can harm plants; leaves rapidly yellow and drop, starting at the base of the plant and progressing upwards.

Before being sold, these plants should be preconditioned to let them adapt to the low-light conditions. This process is carried out in specially

shaded areas where frequency of application of fertilizer and water are restricted. With proper management, most foliage plants acclimatize in 4 to 8 weeks, but some types require as much as 6 months. Obviously, this extra care adds to the cost, but if you buy bargain plants not properly preconditioned you will frequently have problems.

The home environment

The indoor environment plays an important role in the survival and longevity of foliage plants. Study the light, temperature and moisture requirements for the various foliage plants and choose the kinds that can be expected to do well under the conditions in your home (See *Guide to Foliage Plant Selection*). Although home temperatures are suitable for most tropicals, the low light levels and low humidity in most homes contribute greatly to foliage plant deterioration.

Light

Insufficient light may cause leaf yellowing, drop of older leaves, and spindly new growth with the leaves smaller and further apart than normal. *Excess light* (full sun) may be too much for many foliage plants, resulting in leaf spotting, yellowing, or wilting. Sudden changes in light intensity should be avoided.

Plants differ in their light requirements, and foliage plants frequently are grouped according to this. In most homes, areas exposed to direct light from south and west windows are high-light areas; areas in the center of rooms, hallways, or along inside walls are low-light areas. Where light intensities are as low as 500 lux, little or no growth will occur. In even less light, plants gradually deteriorate.

If it's too dark in the desired area, extra light may help. For instance, plants in very dark areas may be grown in decorative mobile planters that you move to lighted areas during the day. Many foliage plants will grow well when given 12 to 14 hours a day of fluorescent light at intensities of 1500 to 2000 lux (the approximate illumination in a well-lit office). Special fluorescent "plant-grow" tubes are excellent artificial light sources.

Compared with incandescent bulbs, fluorescent tubes produce more light per watt of energy, give off less heat, and minimize risk of leaf scorching. Whereas the safe distance from plants to a 40-watt incandescent bulb is 40 cm, a 40-watt fluorescent tube can be placed as close as 10 cm. For most foliage plants, however, a distance of 30 to 60 cm between fluorescent tubes and plants is more appropriate.

When selecting foliage plants, keep in mind that plants adapted to shady (woodland) environments will require less light than those adapted to bright (desert) environments. Plants with broad or green foliage need less light than those with narrow or variegated foliage. Varieties of the

same species or type may differ in their light requirements. As they get older, split-leaf philodendron plants may not produce leaves with splits, due either to low light intensity or to improper watering. The loss of leaf variegation in some plants may also result for the same reasons.

Plants always turn their foliage toward the light, so remember to give them a half turn once every week or two to keep their shape well balanced. As a guide, avoid buying plants that need high light intensities, since these are more difficult to maintain in most homes.

Temperature

Most foliage plants grow best in an even, moderate temperature ranging from 15 to 22°C. During the winter, move your plants back from the window so that neither foliage nor flowers touch the glass.

In homes and other buildings, night or daytime temperature (or both) are being increasingly reduced to conserve energy. This can result in injury, especially to low-temperature sensitive plants. Temperature drops to below 10°C for extended periods can cause damage such as leaf yellowing, dropping of leaves, and in some cases, death of the plant. Plants kept on the drier side with less fertilization will survive better under these circumstances. Avoid placing plants in locations with widely fluctuating temperatures such as in front of heating or air-conditioning ducts. Hot or cold drafts may be injurious.

Humidity

Since most foliage plants are tropical in origin, it is rarely possible to get the atmosphere humid enough, especially during the winter. Generally, foliage plants prefer a higher humidity than that found in most homes or offices, but they will tolerate less. The problem can be severe during the winter when the average room has only about 10 to 20% relative humidity. This may cause leaves to develop brown tips or margins (especially on thin-leaved plants), or can lead to leaf or flower drop. Thus, any means of increasing the humidity will benefit the plant. Try placing plants over pans of moist sand or pebbles, close to trays of water, or use home humidifiers. Group plants close together to help increase local humidity, since all plants give off water vapor. Spraying plants with a fine mist also helps but is not always practical. You can place plants that require a very humid atmosphere in special containers such as fish tanks or terrariums (See *Special Growing Methods*).

Ventilation

Proper ventilation is more essential for humans than for plants. In the daytime, plants discharge oxygen and take in carbon dioxide from the

air. At night the process is reversed, but the quantity of carbon dioxide given off is so minute that it is of no significance. Thus, it is a misconception that plants should be removed from bedrooms or sick-rooms at night. The ventilation from open doors or even from under doors is sufficient to supply the fresh air people need.

On the other hand, many plants are sensitive to minute quantities of indoor pollutants such as those from sprays or some cleaning fluids, and from incomplete combustion or leaks in gas ranges and furnaces. With the new energy conservation programs, homes are becoming more tightly sealed; this not only prevents energy loss, but limits pollution escape.

Culture and care

Containers

You can add to the attractiveness of your rooms by carefully selecting potting containers. You can choose from a wide variety of colors, sizes, shapes and types. You will find them in clay, plastic, metal, ceramic and glass, and you can buy hanging baskets, dish gardens, and terrariums.

The type of container should make little difference to the plant if you water correctly. However, clay pots are considered somewhat superior since they let some water seep through, making over-watering more difficult, and by allowing better aeration of plant roots.

Ideally, containers should have drainage holes. Pots without drainage holes can be used but watering is more critical. Plants grown in watertight containers are more easily damaged by lack of aeration and accumulation of fertilizer salts. These containers must have at least a 1 to 3 cm layer of horticultural charcoal, gravel, pieces of broken clay or similar inert material placed in the bottom. The deeper the container, the deeper this layer should be. The new self-watering containers that reduce maintenance and watering are satisfactory for many plants, but are more expensive.

Soak new porous clay pots for about an hour before use to replace the air in the walls with water. Scrub old pots thoroughly before you reuse them.

Soil mixes

It is important to use a good disease-free soil mix for potting or replanting. Foliage plants usually grow best in a mixture containing 50% organic matter, but the mixture should be light, well-aerated, and well drained. Peat moss is usually preferred as a source of organic matter because of its availability and sterility. For acid-loving plants such as camellia and gardenia, acid peat moss is desirable as the organic matter. Such plants as cacti and succulents grow best in soil containing 30 to 50%

sand. Colored sand or other colored inert materials are available for use in dish gardens or terrariums, but should not be used to make regular soil mixes.

Garden soil alone is *not* suitable. It must be mixed with organic matter such as peat moss or well-rotted manure, and with sand or artificial media such as vermiculite, perlite or other coarse aggregates. Mixing can be quite a messy task. Furthermore, garden soil is not sterile and contains both weed seeds and disease spores.

These problems can be solved if you buy soilless potting mixes at garden centers and other outlets. These mixes are formulated to allow for good root penetration. They are well aerated, allow rapid drainage, have good water-holding capacity, and most are presterilized to prevent trouble from weeds, diseases, and other soil pests. Although soilless mixes may contain some plant food, regular feeding with dry or liquid fertilizers will be needed to keep plants healthy.

Soil mixes should be moistened before use. They are usually moist enough for use if they will squeeze into a ball in the fist, but still break into crumbs readily when dropped.

Potting and replanting

A most important point to remember when potting new plants or rooted cuttings is not to set them too deeply.

Established plants will normally require replanting when the root systems become pot-bound, that is, when roots are in a tight ball and begin to completely cover the sides of the soil ball. This makes it difficult to water and fertilize properly and may result in leaf yellowing or leaf drop. A pot-bound plant should be repotted into a larger size pot. Because plants do not grow vigorously during the winter, it is best to repot in the spring when root activity increases; the plants will then be able to make strong growth during the longer summer days. Do not repot plants while they are dry; water them first.

Remove the plant and soil ball from the old pot by inverting the plant and tapping the rim of the pot sharply. Remove the upper 2 to 5 cm of soil, with possibly some roots, then the old drainage crock or gravel from the base of the root ball, and force the roots apart with your fingers. Loosen the root mass so that the individual roots can come into contact with the fresh soil. If you find that some of the roots are rotted, remove these with the surrounding soil.

Select a pot of the right size. A 2-3 cm increase in pot size (top diameter) usually gives good growth response and balance between pot and plant. If root rot is present, it may be possible to repot the plant in the same size container. Avoid transplanting into a pot that is much larger.

Place the plant in the center of the pot and add soil gradually, packing it with your fingertips. Pack the soil uniformly and thoroughly to eliminate large air spaces which may cause quick drying. Firm the soil around the roots, but not excessively. One common mistake is to fill the

whole pot at once and then firm only the top. A thin stick you can fit between the soil ball and the pot will help firm the soil all the way down. Do not plant too deeply. The new soil level should be the same as it was in the old pot. To facilitate watering, the soil surface should be 0.5 cm below the rims of smaller pots (up to 10 cm in diameter) and 1-2 cm below the rims of larger ones.

Apply enough water to wet the original soil ball and the newly added potting soil. If plant roots have been severely disturbed, it may be advisable to shade or cover the plants with plastic for a few days to prevent wilting.

Pot-bound plants in large tubs or containers may be top-dressed with potting soil for several years to save the time and expense of repotting. To topdress, remove the upper 5 cm of soil and roots, and replace with fresh potting soil.

Watering

Improper watering causes the greatest number of house plant problems. It is a common misconception that since most foliage plants are tropical they should be kept very moist. In fact, *overwatering* is perhaps the most common mistake. Keeping the soil too wet and allowing the pot to stand in water results in poor soil aeration, which in turn leads to root rot. This frequently happens with watertight containers. The soil in containers provides only a limited space for air and water, both of which are essential for healthy roots. If water fills all the space the resulting oxygen deficiency can kill roots, particularly the small new ones that are the major means of water uptake. Once roots are damaged, leaf symptoms follow, such as browning of leaf tips or margins, yellowing of lower leaves and dropping of foliage. There is little or no new growth; the entire plant sometimes wilts. To avoid overwatering problems, use a good potting mixture, provide good drainage and don't let the plant stand in water.

If there seems to be root damage due to keeping the soil too wet, try to save the plant by reducing the frequency of watering. Additionally, you should enclose the plant in a plastic bag for several weeks. This keeps the foliage turgid while the plant has a chance to grow new roots.

Foliage plant problems from *underwatering* are less frequent. Underwatering usually is due either to neglect or to the temptation to be "too kind" to your plants. Avoid the temptation to give a little drop of water each day. One danger in light, frequent watering is that the top of the soil may be moist while the rest of the soil gradually becomes dry. Unfortunately, the symptoms of overwatering and underwatering are quite similar, but the cure is very different.

There is no set schedule for watering foliage plants. Light, humidity, temperature, size and type of pot, soil mix, and plant type all affect frequency of watering. Some plants, like ferns, need a relatively moist soil, while others, like succulents and cacti, grow best under drier conditions.

In most cases, foliage plants do not need daily watering. Many will require watering only once a week, and some even less often. During the winter when plants are growing slowly it is better to keep plants on the dry side. Successful growers check their plants frequently, but water them only when necessary. Trial and error will teach you how much water a particular plant needs in a particular location.

Soil in porous clay pots will dry out more rapidly than that in plastic or non-porous containers. Because of the volume, soil in large containers will dry out more slowly and may only require watering every 2 to 4 weeks. Plants not established in the pot in which they are sold are easily overwatered.

Some soils may look dry when they are not, or look wet when they are dry. If in doubt, these simple tests may help to tell you when your plants need water. Press a dry fingertip on the top of the soil; if soil particles adhere and the surface is resilient there may be no need for water. If a toothpick thrust into the soil comes out clean, water is probably required. Tap a clay pot with a stick; if the sound is dull, the soil is moist; if hollow, watering is likely required (this does not work with plastic pots). A heavy pot is wet, a light pot is dry. But be aware that the new soilless mixes are much lighter than those containing soil.

Regardless of how often you water, apply enough to wet the entire ball of soil. Let the excess moisture drain away quickly and pour it off. Overly wet soil encourages rotting of roots. Never let a plant sit in a saucer of water for prolonged periods; discard excess water from the saucer 10 minutes after watering.

Soil that has become overly dry is difficult to wet. If the soil becomes extremely dry, submerge the entire pot in water and leave it standing until the bubbles stop rising, remove and allow the excess water to drain away.

It is important that your water be at room temperature. Cold water will shock your plants.

It really depends on your own taste whether you water from the top or from below. Watering from below is common but it is not essential, and is not recommended for plants such as succulents that prefer a relatively dry soil. If you choose to top water be careful to wet only the soil and not the foliage or crown since this invites disease. If you choose to water from below, stand pots in a tray partly filled with water, and let capillary action do the rest. Give these plants a thorough top watering once a month. This flushes the soil and helps prevent damage from fertilizer buildup that could eventually damage the roots. Plants such as begonias and ferns respond well to this method.

Prolonged use of water from a water softener may result in poor plant growth. In such cases, repot the plant in fresh soil and water with unsoftened water. The chlorine or fluoride in city water supplies do not injure most plants, although some, such as spider plants and some palms, are sensitive. Let your tap water sit in an open container overnight. This lets some of the chemicals evaporate and ensures that the water is at room temperature — neither too warm nor too cold.

Vacation-time watering

If you are going to be away for several days, a thorough watering of your foliage plants just before departure is generally enough. Keep plants out of direct sunlight and in as cool a place as possible. Kitchen sinks and bathtubs are favorite places to group plants before leaving.

For longer periods, try asking a neighbor to check your plants at least once a week, or solicit the aid of special plant-care operators who offer this service for a small fee.

Alternatively, you can improvise one or a combination of moisture conservation and self-watering methods. For instance, water will feed constantly by capillary action through cloth wicks hanging from a water-filled bottle to the surface of pots standing at a lower level. Also, plants may be thoroughly watered, then grouped over pebbles in a wet tray or over a tray with moist peat moss. Plants covered individually or in groups with plastic will keep moist for 2 or 3 weeks. Water the plants thoroughly and examine them before covering; support or secure the cover over the plants so the plastic doesn't touch the foliage. If you plan to be away for less than 10 days, the plastic cover may be allowed to hang more loosely over the plants.

Another example is to place pots on burlap or special felt mats, which conduct water by capillary action from a lower level (i.e. a sink filled with water) to pots placed at a higher level (i.e. counter top). You can probably devise similar or related methods based on the above principles.

Ideal solutions to this problem involve special growing methods, described in a later section; these completely eliminate the need for frequent watering.

Fertilizing

Foliage plants need not be fertilized frequently. As with watering, many more house plants suffer from overfertilizing than from a lack of it. Too much fertilizer injures plant roots, which unfortunately results in the same symptoms as overwatering. This makes diagnosis difficult.

Plants grown in watertight containers are more likely to be damaged by too frequent fertilizing, since the excess cannot be flushed through the soil mix. In most cases, the object is to maintain the plants rather than get appreciable growth. Too much fertilizer under low-light conditions causes new growth to be soft and spindly. Since the fertilizers often used by the commercial grower may not have been completely removed at the time of sale, plants generally do not need fertilizer for several months after you buy them. As a precaution, the soil medium of newly purchased plants should be washed through two or three times with water to remove residual fertilizer. Do not try this on plants in containers without drainage holes.

Application of fertilizer twice a year may be entirely adequate to maintain most plants, while an additional one or two applications may be

needed if you want an appreciable amount of growth. Common foliage or houseplant fertilizers may be used. The high-analysis, complete fertilizers such as 15-15-15 or 20-20-20 come as either liquid concentrates or in dry form; mix and dilute these according to the manufacturer's recommendations before use. Follow directions carefully since a mistake in dilution of these highly concentrated fertilizers can injure or kill plants.

Alternatively, you can apply lower analysis fertilizers such as 4-12-4, 5-10-5, or 4-16-16. These are often sold as tablets that dissolve slowly in the soil moisture. Slow-releasing dry fertilizer capsules such as 14-14-14 mixed into the potting soil or applied to the surface are also quite satisfactory. They provide a safe, steady flow of nutrients for an extended period but are more expensive.

Never fertilize if the soil is dry, since fertilizer applied to dry soil may burn roots and damage the plant. Water the plant, then fertilize. Never fertilize if the plant appears to be sick. Adding more fertilizer to an already sick plant may worsen the situation or prove fatal. Usually fertilizer is not what is needed.

During the winter months many plants take a rest and will make little new growth until the days lengthen in early spring. Reduce the recommended rate of soluble fertilizers to half or quarter strength, or do not fertilize at all.

Care of foliage

The leaves of foliage plants frequently become dusty and dirty. Not only are such leaves unsightly, but dirt can cause physiological problems by clogging the leaf pores (stomata). You can remove most dirt by gently wiping with a soft cloth or sponge. Periodic misting of plants with a spray bottle will freshen the foliage but can cause serious deposit problems if the water is alkaline or hard. Frequent misting can also encourage the spread of certain diseases from plant to plant. Do *not* wet the foliage of plants with fuzzy leaves, such as velvet plant.

Soapy water is an excellent cleaning agent for leaves. Commercial plant shines, milk, olive oil and similar liquids improve the luster of leaves, but leave a filmy deposit that may clog the stomata. This in turn may result in more leaves becoming yellow and in reduced plant growth.

Disorders

Foliage plants are generally quite free of disease and insect pests. Thus, most problems of plants in the home are due to improper care and from the environment.

Diseases such as bacterial and fungal leaf spots and blights, or fungal root rots, are rare in the home, compared with commercial greenhouses or foliage plant nurseries. The dry conditions in homes help to prevent the spread of foliar diseases. Infected leaves can easily be cut off and discarded.

Plants may be infected with powdery mildew, a disease that can develop on dry foliage, resulting in leaf drop or foliage blemish. This is most likely when large fluctuations occur in day and night temperatures, particularly close to a window during certain periods of the year. Root rots may develop from poor drainage and overwatering. Use a good potting mix and water carefully to help prevent this.

Although commercial producers regularly spray plants, diseases or eggs of insects such as spider mites occasionally may be carried into the home.

Insects that infect foliage plants generally belong to two groups, those that eat parts of the plants and those that suck the sap. Most insects infecting foliage plants belong to the second group. The most common are mealy bugs, mites, scale insects and aphids.

Mealy bugs are oval, somewhat flattened and covered with a white, waxy, powdery material that makes them more difficult to wet with pesticides. These can be killed by dipping a cotton swab in alcohol and touching the insects. Scale insects are often found on schefflera, palms and citrus, and can be controlled by scrubbing off with soapy water.

Springtails are very small, whitish insects, often seen moving about very rapidly on the soil surface. Although these do not seriously damage the plants, their presence is annoying and indicates an infected potting mix. Control of these will require an insecticidal drench.

Wiping or washing plants with lukewarm soapy water on a regular basis will help to eliminate many of the sap-sucking pests. Occasionally, badly infested plants may require the use of chemicals. There are many commercial chemicals available. These come as aerosol sprays, liquids or dusts, and may be fungicides, insecticides or a combination of both. Observe all precautions on the label before using, and mix only at the rate given.

The best way to control insects is to *prevent* infestation. Isolate freshly bought plants from your collection of clean plants for a few weeks in a separate room. If, after that time, they show no signs of insects, group them with your other plants.

Special growing methods

HYDROCULTURE Hydroculture (also called hydroponics) is a method of growing plants with their roots immersed in water supplied with plant food. The idea of roots being kept constantly in water may seem to conflict with previous warnings about the dangers of overwatering. However, roots formed in water have a different structure from those grown in potting mixtures, and do not suffer from waterlogging because their outer cells have an expanded space for oxygen storage. Since the root system is different, it is best to start from plantlets or shoots rooted in water. Roots established in potting mix can be washed free of soil and placed in hydroculture, but this is more risky since establishment will depend on the formation of new roots.

The most elementary form of hydroculture involves implanting of the plant in a combination of aggregates (3-15 mm in diameter) to provide necessary anchorage. Aggregates may be inert granular materials such as grit, pea-gravel, crushed granite chips, lignite, perlite, vermiculite or expanded clay pieces. The addition of charcoal pieces will help purify the water.

Any unperforated vessel or container can be used. Put in enough aggregates to fill the pot. Fill with water, to which you have added a special brand-name fertilizer formulated for hydroculture. Be sure you have used the proper dilution. Carefully implant the shoot or rooted cutting.

You can buy various self-watering, self-feeding double pots (some with built-in water gauges), but these are more expensive. In these, roots come into contact with water seeping through holes in the bottom of the small inner aggregate-filled pot, which can be lifted out of the larger one.

With hydroculture, watering and feeding are much reduced since these operations become merely a matter of topping up the container or reservoir as necessary. The water-fertilizer solution requires complete change only at intervals of several weeks to several months, so maintenance and vacations are less of a problem.

Repotting is necessary only when a plant looks awkward or when it becomes top-heavy. Plants can be renewed from cuttings at regular intervals and replanted in cleansed or new aggregate.

Although virtually any plant can be successfully grown in hydroculture, some common foliage plants suited for this purpose are arrowhead vine, Chinese evergreens, piggyback plant, pothos and Wandering Jew.

TERRARIUMS A terrarium (also called a bottle garden) is a glass or plastic container with plants growing inside. It provides a controlled environment with steady high humidity supplied by the plants themselves. Containers range from goblets and open fish tanks to bottles of any size with small openings. Once completed, a terrarium takes care of itself and may not require watering if the container's opening is small.

Start with a clean container. Place a layer of inert drainage material at least 2.5 cm deep at the bottom. Drainage materials may be of sorts previously described, or of special colored sand or gravel for decorative effects. Pieces of charcoal included with the drainage material will help keep the soil from going sour. Add a layer of sphagnum peat moss, then sterilized soilless mix to a depth of one to two times that of the drainage layer. The sphagnum moss helps prevent the soil mix from sifting down and clogging the drainage.

If the container's opening is small, install and plant tiny plantlets using flexible wires, long prongs, rods or long-handled spoons. Check to make sure each plant is healthy and free of disease or insects. Use a rod or stick to tamp the soil around the roots. A cotton swab attached to a wire may be used to wipe off any soil that gets on the glass sides while planting. Using a funnel attached to flexible tubing, add water diluted with plant food at the appropriate concentration. The soil mix should be as moist as previously described for conventional growing.

Keep the bottle in good light, but don't put it in direct sunlight or close to a radiator or other source of heat; this could easily result in overheating and harm to the plants.

Since terrariums tend to get a bit overgrown after several years, slower growing plants are more suitable. As a rule, choose plants with similar cultural requirements so that they stay in scale with each other and the container as they grow. For instance, the following foliage plants grow well together and offer a wide variety of colors and shapes: baby's tears, Chinese evergreens, crotons, English ivy, ferns, gold-dust plant, pileas and pothos.

As the plants grow, they may need to be pruned to retain shape and form. Dead leaves may have to be removed occasionally. These operations may require special tools if the opening is narrow.

Guide to foliage plant selection

This list should be used only as a guideline. Higher humidity with good air circulation, for example, can permit exposure to more intense light than indicated; extremely low humidity with still air can decrease the tolerance. Always make changes gradually, moving one step at a time from lower to brighter light.

LIGHT REQUIREMENTS *Low light* (shade) throws a shadow that is barely visible and with no outline. This type of light occurs in dimly lighted areas or near north windows. It is also found in many offices that are lit by fluorescent fixtures. *Moderate light* (partial shade, diffused or filtered light) is usually bright enough for reading without artificial light. The shadow of your hand will show a fuzzy but still distinguishable outline. East and west windows, through most of the year, fall into this category. *Bright indirect* will show a shadow with a sharply defined outline. Locations near south windows, and at certain seasons, east and west windows, generally are in this category; the light is filtered or indirect. *Direct sun* is sunlight that falls directly on the plant for as long as 4-6 hours per day.

WATER REQUIREMENTS *Moderately dry* is for plants, such as cacti and succulents, that can even be allowed to dry out between waterings. *Moderately moist* is for most foliage plants. These need to be kept uniformly moist but not overly wet. *Very moist* is for plants, such as ferns, that require watering when the soil starts to dry.

TEMPERATURE REQUIREMENTS *Cool* temperatures are day, 13-15°C; night, 5-7°C. *Average* temperatures are day, 21-24°C; night, 10-13°C. *Warm* temperatures are day, 26-30°C; night, 16-18°C.

Botanical name	Common name	Light			Water			Temperature		
		Low	Moderate	Bright indirect	Direct sun	Moderately dry	Moderately moist	Very moist	Cool	Warm
<i>Acalypha wilkesiana</i> and cultivars	copper leaf	•	•	•	•	•	•	•	•	•
<i>Adiantum raddianum</i> (<i>cuneatum</i>)	delta maidenhair fern	•	•	•	•	•	•	•	•	•
<i>Aechmea fasciata</i>	silver vase; urn plant	•	•	•	•	•	•	•	•	•
<i>Agave americana</i> 'Marginata'	century plant	•	•	•	•	•	•	•	•	•
<i>Aglaonema commutatum</i>	Chinese evergreen	•	•	•	•	•	•	•	•	•
<i>Aglaonema simplex</i>	Chinese evergreen; golden evergreen	•	•	•	•	•	•	•	•	•
<i>Aloe barbadensis</i> (<i>vera</i>)	medicinal aloe	•	•	•	•	•	•	•	•	•
<i>Aphelandra squarrosa</i>	zebra plant	•	•	•	•	•	•	•	•	•
<i>Araucaria heterophylla</i>	Norfolk Island pine	•	•	•	•	•	•	•	•	•
<i>Asparagus species</i>	asparagus fern	•	•	•	•	•	•	•	•	•
<i>Aspidistra elatior</i>	cast-iron plant	•	•	•	•	•	•	•	•	•
<i>Asplenium nidus</i>	bird's nest fern	•	•	•	•	•	•	•	•	•
<i>Aucuba japonica</i>	Japanese laurel; gold dust tree	•	•	•	•	•	•	•	•	•
<i>Beaucarnea recurvata</i>	pony tail plant	•	•	•	•	•	•	•	•	•
<i>Begonia rex</i> — cultivar cultivars	rex begonia	•	•	•	•	•	•	•	•	•
<i>Brassaia</i> (<i>Schefflera</i>) <i>actinophylla</i>	umbrella tree	•	•	•	•	•	•	•	•	•
<i>Caladium X hortulanum</i>	elephant's ear	•	•	•	•	•	•	•	•	•
<i>Camellia japonica</i>	camellia	•	•	•	•	•	•	•	•	•
<i>Carissa grandiflora</i>	Natal plum	•	•	•	•	•	•	•	•	•
<i>Chamaedorea erumpens</i>	parlor palm; bella palm	•	•	•	•	•	•	•	•	•
<i>Chlorophytum comosum</i> and cultivars	bamboo palm	•	•	•	•	•	•	•	•	•
<i>Chrysalidocarpus lutescens</i>	spider plant	•	•	•	•	•	•	•	•	•
<i>Cissus antarctica</i>	areca palm	•	•	•	•	•	•	•	•	•
	kangaroo vine	•	•	•	•	•	•	•	•	•

Cissus (Rhoicissus) rhombifolia
Citrus limon and cultivars
Citrus X paradise
Citrus sinensis
Codiaeum variegatum and cultivars
Coffea arabica
Cordyline terminalis
Crassula argentea
Crypthantus species
Cyperus alternifolius

Dieffenbachia amoena
Dieffenbachia maculata (picta)
Dizygotheca elegantissima
Dracaena deremensis 'Warneckii'
Dracaena fragrans
Dracaena marginata
Dracaena reflexa
Dracaena sanderana
Dracaena surculosa (godseffiana)
Dracaena thalioides

Epipremnum aureum
Episcia cupreata and cultivars
X Fatschedera lizei

Ficus benjamina
Ficus elastica and cultivars
Ficus lyrata
Ficus pumila
Fittonia verschaffeltii

Gardenia jasminoides
Guzmania lingulata minor
Gynura aurantiaca

Hedera helix and cultivars
Hemigraphis 'Exotica'

grape ivy
 lemon
 grapefruit
 sweet orange
 croton
 Arabian coffee tree
 Hawaiian ti-plant
 jade plant
 earth star
 umbrella plant

 giant dumbcane
 spotted dumbcane
 false aralia
 Warneck's dracaena
 corn plant
 Madagascar dragon tree
 pleomele
 ribbon plant
 gold-dust dracaena
 lance dracaena

 devil's ivy; golden pothos
 flame violet
 tree ivy; aralia ivy

 weeping fig
 rubber tree
 fiddleleaf fig
 creeping fig
 nerve plant; fittonia

 gardenia
 guzmania
 velvet plant

 English ivy
 purple waffle plant

Botanical name	Common name	Light			Water			Temp- erature
		Low	Moderate	Bright indirect	Moderately dry	Moderately moist	Very moist	
<i>Howea forsterana</i>	sentry palm; kentia palm	•			•			•
<i>Hoya carnosa</i>	wax plant	•	•		•			•
<i>Hypoestes phyllostachya</i> (<i>sanguinolenta</i>)	polka dot plant	•	•		•			•
<i>Kalanchoe daigremontiana</i>	devil's backbone	•	•	•	•			•
<i>Kalanchoe tomentosa</i>	panda plant		•	•	•			•
<i>Maranta leuconeura leuconeura</i> (<i>massangeana</i>)	prayer plant	•			•	•		•
<i>Mimosa pudica</i>	sensitive plant		•		•			•
<i>Monstera deliciosa</i>	Swiss-cheese plant; split-leaf philodendron	•	•		•			•
<i>Nephrolepis exaltata</i> 'Bostoniensis'	Boston fern	•	•		•	•		•
<i>Pandanus veitchii</i>	screw pine	•	•	•	•			•
<i>Pedilanthus tithymaloides</i>	devil's backbone		•	•	•			•
<i>Pellionia daveauana</i>	trailing watermelon begonia	•			•			•
<i>Pellionia pulchra</i>	satin pellionia	•	•		•			•
<i>Peperomia argyreia</i> (<i>sandersi</i>)	watermelon peperomia	•	•		•			•
<i>Peperomia caperata</i> 'Emerald Ripple'	emerald ripple peperomia	•	•	•				•
<i>Peperomia emarginella</i> (<i>minima</i>)	miniature peperomia	•	•		•			•
<i>Peperomia obtusifolia</i>	pepper-face; baby rubber plant	•	•	•				•
<i>Persea americana</i>	avocado		•	•	•			•
<i>Philodendron scandens oxycardium</i>	heartleaf philodendron	•	•		•			•
<i>Philodendron selloum</i>	saddle-leaf philodendron	•	•		•			•
<i>Phoenix dactylifera</i>	date palm	•	•	•	•			•
<i>Phoenix roebelenii</i>	miniature date palm	•	•	•	•			•
<i>Pilea cadieri</i>	aluminum plant	•			•			•
<i>Pilea depressa</i>	creeping pilea	•			•			•

Pilea involucreata
Pilea microphylla
Platycerium bifurcatum
Plectranthus australis
Plectranthus oertendahlui
Polypodium aureum areolatum

Polyscias balfouriana 'Marginata'
Polyscias fruticosa
Pteris quadriaurita 'Argyraea'

Rhoeo spathacea

Sansevieria trifasciata
Sansevieria trifasciata 'Hahnii'
Saxifraga stolonifera
Scindapsus pictus
Sedum morganianum
Senecio macroglossus 'Variegatum'
Senecio mikanioides
Senecio rowleyanus
Setcreasea pallida 'Purple Heart'
Soleirolia (Helxine) soleirolii
Spathiphyllum 'Clevelandii'
Syngonium podophyllum

Tolmiea menziesii
Tradescantia species and cultivars
Yucca glauca
Zebrina pendula

friendship plant	•	•	•	•	•
artillery plant	•		•	•	•
staghorn fern		•	•	•	•
Swedish ivy	•	•	•	•	•
Brazilian coleus	•	•	•	•	•
hare's-foot fern;					
polypody fern	•		•	•	•
Balfour aralia	•	•	•	•	•
Ming aralia	•	•	•	•	•
silver fern	•		•	•	•
Moses-in-the-cradle	•	•	•	•	•
snake plant	•	•	•	•	•
birdsnest sansevieria	•	•	•	•	•
strawberry begonia		•	•	•	•
satin pothos	•	•	•	•	•
burro's tail		•	•	•	•
variegated wax ivy	•		•	•	•
German ivy	•		•	•	•
string-of-beads		•	•	•	•
purple heart		•		•	•
Irish moss; baby's tears		•	•	•	•
white anthurium; peace lily	•	•		•	•
arrowhead vine	•	•	•	•	•
piggyback plant	•	•	•	•	•
wandering Jew	•	•	•	•	•
Spanish bayonet		•	•	•	•
wandering Jew	•	•	•	•	•

List of plants by common name

Common name	Botanical name
Aluminum plant	<i>Pilea cadierei</i>
Aralia ivy	X <i>Fatschedera lizei</i>
Areca palm	<i>Chrysalidocarpus lutescens</i>
Arrowhead vine	<i>Syngonium podophyllum</i>
Artillery plant	<i>Pilea microphylla</i>
Asparagus fern	<i>Asparagus</i> sp.
Avocado	<i>Persea americana</i>
Baby rubber plant	<i>Peperomia obtusifolia</i>
Baby's tears	<i>Soleirolia soleirolii</i>
Balfour aralia	<i>Polyscias balfouriana</i> 'Marginata'
Bamboo palm	<i>Chamaedorea erumpens</i>
Begonia	<i>Begonia</i> sp.
Bella palm	<i>Chamaedorea elegans</i>
Bird's nest fern	<i>Asplenium nidus</i>
Boston fern	<i>Nephrolepis exaltata</i> 'Bostoniensis'
Brazilian coleus	<i>Plectranthus oertendahlia</i>
Burro's tail	<i>Sedum morganianum</i>
Caladium	<i>Caladium</i> X <i>hortulanum</i>
Camellia	<i>Camellia japonica</i>
Cast iron plant	<i>Aspidistra elatior</i>
Century plant	<i>Agave americana</i> 'Marginata'
Chinese evergreen	<i>Aglaonema</i> sp.
Chlorophytum	<i>Chlorophytum</i> sp.
Coffee tree	<i>Coffea arabica</i>
Copperleaf	<i>Acalypha wilkesiana</i>
Corn plant	<i>Dracaena fragrans</i>
Creeping fig	<i>Ficus pumila</i>
Creeping pilea	<i>Pilea depressa</i>
Croton	<i>Codiaeum variegatum</i>
Crypthanthus	<i>Crypthanthus</i> sp.
Date palm	<i>Phoenix</i> sp.
Delta maidenhair fern	<i>Adiantum raddianum</i> (cuneatum)
Devil's backbone	<i>Kalanchoe daigremontiana</i> ; <i>Pedilanthus tithymaloides</i>
Devil's ivy	<i>Epipremnum aureum</i>
Dracaena	<i>Dracaena</i> sp.
Dragan tree	<i>Dracaena marginata</i>
Dumbcane	<i>Dieffenbachia</i> sp.
Earth star	<i>Crypthanthus</i> sp.
Elephant's ear	<i>Caladium</i> X <i>hortulanum</i>
Emerald ripple peperomia	<i>Peperomia caperata</i> 'Emerald ripple'
English ivy	<i>Hedera helix</i>

Common name

False aralia
Fiddleleaf fig
Fig
Fittonia
Flame violet
Friendship plant
Gardenia
German ivy
Gold dust tree
Golden evergreen
Golden pothos
Grapefruit
Grape ivy
Guzmania
Hare's foot fern
Hawaiian ti-plant
Heart-leaf philodendron
Irish moss
Jade plant
Japanese laurel
Kalanchoe
Kangaroo vine
Kentia palm
Lemon
Medicinal aloe
Ming aralia
Moses-in-the-cradle
Natal plum
Nerve plant
Norfolk Island pine
Panda plant
Parlor palm
Peace lily
Peperomia
Pepper-face
Philodendron
Piggyback plant
Pilea
Pleomele
Polka dot plant
Polypody fern
Pony tail plant
Pothos

Botanical name

Dizygotheca elegantissima
Ficus lyrata
Ficus sp.
Fittonia verschaffeltii
Episcia cupreata
Pilea involucrata
Gardenia jasminoides
Senecio mikanioides
Aucuba japonica
Aglaonema simplex
Epipremnum aureum
Citrus X *paradise*
Cissus rhombifolia
Guzmania lingulata minor
Polypodium aureum areolatum
Cordyline terminalis
Philodendron scandens oxycardium
Soleirolia soleirolii
Crassula argentea
Aucuba japonica
Kalanchoe tomentosa
Cissus antartica
Howea forsterana
Citrus limon
Aloe barbadensis (vera)
Polyscias fruticosa
Rhoeo spathacea
Carissa grandiflora
Fittonia verschaffeltii
Araucaria heterophylla
Kalanchoe tomentosa
Chamaedorea elegans
Spathiphyllum 'Clevelandii'
Peperomia sp.
Peperomia obtusifolia
Philodendron sp.
Tolmiea menziesii
Pilea sp.
Dracaena reflexa
Hypoestes phyllostachya (sanguinolenta)
Polypodium aureum areolatum
Beaucarnea recurvata
Scindapsus sp.

Common name**Botanical name**

Prayer plant	<i>Maranta leuconeura leuconeura</i> (<i>massangeana</i>)
Purple heart	<i>Setcreasea pallida</i> 'Purple heart'
Purple waffle plant	<i>Hemigraphis</i> 'Exotica'
Ribbon plant	<i>Dracaena sanderana</i>
Rubber tree	<i>Ficus elastica</i>
Saddle-leaf philodendron	<i>Philodendron selloum</i>
Satin pellionia	<i>Pellionia pulchra</i>
Schefflera	<i>Brassaia actinophylla</i>
Screw pine	<i>Pandanus veitchii</i>
Selloum philodendron	<i>Philodendron selloum</i>
Sensitive plant	<i>Mimosa pudica</i>
Sentry palm	<i>Howea forsterana</i>
Silver fern	<i>Pteris quadriaurita</i> 'Argyraea'
Silver vase	<i>Aechmea fasciata</i>
Snake plants	<i>Sansevieria</i> sp.
Spanish bayonet	<i>Yucca glauca</i>
Spider plants	<i>Chlorophytum</i> sp.
Split-leaf philodendron	<i>Monstera deliciosa</i>
Staghorn fern	<i>Platynerium bifurcatum</i>
Strawberry begonia	<i>Saxifraga stolonifera</i>
String-of-beads	<i>Senecio rowleyanus</i>
Swedish ivy	<i>Plectranthus australis</i>
Sweet orange	<i>Citrus sinensis</i>
Swiss-cheese plant	<i>Monstera deliciosa</i>
Tree ivy	X <i>Fatshedera lizei</i>
Umbrella plant	<i>Brassaia actinophylla</i> ; <i>Cyperus alternifolius</i>
Urn plant	<i>Aechmea fasciata</i>
Variegated wax ivy	<i>Senecio macroglossus</i> 'Variegatum'
Velvet plant	<i>Gynura aurantiaca</i>
Wandering Jew	<i>Tradescantia</i> sp.; <i>Zebrina pendula</i>
Watermelon begonia	<i>Pellionia deveauana</i>
Wax plant	<i>Hoya carnosa</i>
Weeping fig	<i>Ficus benjamina</i>
White anthurium	<i>Spathyphyllum</i> 'Clevelandii'
Yucca	<i>Yucca glauca</i>
Zebra plant	<i>Aphelandra squarrosa</i>

Guide to foliage plant disorders and possible causes

Many foliage plant problems are a result of faulty culture. Similar symptoms can result from a number of causes.

Symptoms	Possible causes
Browning of leaf tips or margins	Overfertilizing Overwatering Lack of water Low humidity Low temperature Pesticide injury Pollutants in the air Poor water quality
Yellow-green foliage	Excess light (direct sun) Poor light Overwatering Too dry (soil or air) High temperature Pot-bound or compact soil Lack of fertilizer Root rot disease
Leaf drop (especially older leaves)	Not preconditioned to low light Overwatering Underwatering Sudden change in light and environment Pot-bound or compact soil Root rot disease Alternating periods of high and low levels of water
Rapid loss or drop of lower leaves	Plant not properly preconditioned to low light Sudden extremes in exposures to light, temperature or humidity Overwatering <i>or</i> underwatering
Gradual loss of lower leaves, leaves turn yellow and fall	Lack of sufficient light Excess or deficiency of fertilizer Overwatering (root loss) <i>or</i> underwatering (lack of water to support foliage) Compact soil (low aeration), pot-bound Root rot disease; mite infestation

Symptoms	Possible causes
Foliage spotted, blotched or blemished	Overwatering (check roots) Burning from intense light Low temperatures Bacterial or fungal infection (if conditions are very humid) Pesticide injury or pollutants in the air Cold water applied to foliage
Spindly growth with leaves small and far apart	Low light Low humidity High temperature
Leaves cup-shaped or curled, numerous small leaves at growing tip, leaves drop continuously	Nutrient disorder Pollutants (i.e. spray or vapor from cleaning fluids, incomplete combustion) Infestations of aphids Pesticides
Partial or entire wilting of plant	Lack of water Overwatering (root rotted away) Low humidity (too dry) Excess fertilizer (roots burned) Root rot disease Cold or hot drafts or extremes of exposure
Stunted plants	Excess fertilizer (root loss) Lack of water (too dry) Overwatering (root loss)
Off-color leaves with grey or yellow speckling, leaves later bronzed and drying; round or oval bumps on foliage; cottony masses on the stems; sticky spots on lower foliage	Spider-mite, scale, mealybug or aphid infestation

CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm ²)	x 0.15	square inch
square metre (m ²)	x 1.2	square yard
square kilometre (km ²)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm ³)	x 0.06	cubic inch
cubic metre (m ³)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2.5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre

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